

Complete Listing of the Claims:

1. -25. (Cancelled)

26. (Previously presented) A method of analyzing a target polynucleotide comprising:
(a) pretreating the surface of a substrate with a polyelectrolyte multiplayer (PEM) to create surface chemistry that facilitates polynucleotide attachment and sequence analysis;

(b) providing a primed target polynucleotide attached to a surface of a substrate;

(c) providing a labeled first nucleotides to the attached target polynucleotide under conditions whereby the labeled first nucleotide attaches to the primer, if a complementary nucleotide is present to serve as template in the target polynucleotide;

(d) determining presence or absence of a signal, the presence of a signal indicating that the labeled first nucleotide was incorporated into the primer, and hence the identity of the complementary base that served as a template in the target polynucleotide;

(e) repeating steps (c)-(d) with a labeled further nucleotide, the same or different from the first labeled nucleotide, whereby the labeled further nucleotide attaches to the primer or a nucleotide previously incorporated into the primer; and

(f) repeating step (e) until identities of the bases in a portion or all of the target polynucleotide are determined.

27. – 40. (Cancelled)

41. (Withdrawn) An apparatus for analyzing the sequence of a polynucleotide, comprising:

(a) a flow cell comprising at least one microfabricated synthesis channel; and

(b) an inlet port and an outlet port, said inlet port and outlet port being in fluid communication with said flow cell for flowing fluids into and through said flow cell.

42. (Withdrawn) The apparatus of claim 41, furthering comprising a detector to detect a signal from said surface.

43. (Withdrawn) The apparatus of claim 42, furthering comprising a light source to illuminate the surface of said synthesis channel.
44. (Withdrawn) The apparatus of claim 42, wherein said signal is a fluorescent signal.
45. (Withdrawn) The apparatus of claim 42, wherein said signal is an electrochemical signal.
46. (Withdrawn) The apparatus of claim 41, wherein said synthesis channel is formed by bonding a microfluidic chip to a substrate.
47. (Withdrawn) The apparatus of claim 46, wherein said microfluidic chip further comprises microfabricated valves and microfabricated pumps in an integrated system with said microfabricated synthesis channel.
48. (Withdrawn) The apparatus of claim 47, further comprising a plurality of reservoirs for storing reaction reagents, wherein said microfabricated valve and said microfabricated pump are connected to said reservoirs.
49. (Withdrawn) The apparatus of claim 41, wherein cross section of said synthesis channel has a linear dimension of less than $100\text{ }\mu\text{m} \times 100\text{ }\mu\text{m}$, less than $10\text{ }\mu\text{m} \times 100\text{ }\mu\text{m}$, less than $1\text{ }\mu\text{m} \times 10\text{ }\mu\text{m}$, or less than $0.1\text{ }\mu\text{m} \times 1\text{ }\mu\text{m}$.
50. (Withdrawn) The apparatus of claim 42, wherein said detector is a photon counting camera.
51. (Withdrawn) The apparatus of claim 46, wherein said microfluidic chip is fabricated with an elastomeric material.
52. (Withdrawn) The apparatus of claim 51, wherein said elastomeric material is RTV silicone.

53. (Withdrawn) The apparatus of claim 52, wherein said substrate is a glass cover slip.

54. (Withdrawn) The apparatus of claim 41, further comprising an appropriately programmed computer for recording identity of a nucleotide when said nucleotide becomes linked to a synthesis channel.